CLAIMS

What is claimed is:

1. A feeding set adaptor comprising:

a first connector configured for attachment to an inflow line of an infusion set and a central pump engaging portion of an infusion set;

a second connector configured for attachment to an outflow line of an infusion set; and

an anti-freeflow mechanism disposed in communications with the one of the first connector and the second connector.

2. The feeding set adaptor according to claim 1, wherein the anti-freeflow mechanism is attached to and spaced apart from one of the first connector and the second connector.

3. The feeding set adaptor according to claim 1, wherein the anti-freeflow mechanism comprises a generally ball-shaped member configured for disposition in the tubing of an infusion set.

4. The feeding set adaptor according to claim 3, wherein the ball-shaped member is attached to one of the first connector and the second connector and spaced away from the connector to which the ball-shaped member is attached so that a flow channel may be

formed around the ball-shaped member and into the connector to which the ball-shaped member is attached.

5. A solution delivery system for disposal on an infusion pump comprising the feeding set adaptor according to claim 1, and further comprising an inflow line, a pump engaging portion, and an outflow line attached to the feeding set adaptor.

6. The solution delivery system according to claim 5, wherein the anti-freeflow mechanism is disposed in one of the inflow line, pump engaging portion and outflow line.

7. The solution delivery system according to claim 6, wherein the anti-freeflow mechanism is attached to the second connector and disposed in the pump engaging portion of the infusion set.

8. The solution delivery system according to claim 7, wherein the outside diameter of the anti-freeflow mechanism is slightly larger than the inside diameter of the pump engaging portion of the infusion set.

9. The solution delivery system according to claim 5, wherein the anti-freeflow mechanism is a generally ball-shaped member.

10. The solution delivery system according to claim 5, wherein the pump engaging portion comprises at least one monitoring portion for optically monitoring pressure within the infusion set.

11. The solution delivery system according to claim 10, wherein the pump engaging portion further comprises at least one abutment member for engaging the feeding set adaptor to minimize movement of the monitoring portion when the pump engaging portion is worked by a pumping mechanism.

12. The solution delivery system according to claim 11, further comprising an optical sensor disposed adjacent to the monitoring portion for determining pressure in the monitoring portion.

13. The solution delivery system according to claim 12, wherein the optical sensor comprises an optical signal emitter and an optical signal emitter and an optical signal detector, and wherein at least a portion of the monitoring portion is disposed between the optical signal emitter and the optical signal detector.

14. The solution delivery system according to claim 13, wherein the monitoring portion is disposed between the optical

signal emitter and the optical signal detector, so that it always occludes some light flow between the optical signal emitter and the optical signal detector.

15. The solution delivery system according to claim 13, wherein the monitoring portion is disposed between the optical signal emitter and the optical signal detector, so that it always allows some light flow between the optical signal emitter and the optical signal detector.

16. The solution delivery system according to claim 11, wherein the feeding set adaptor has at least one tube engaging member and wherein the abutment member of the pump engaging portion engages the tube engagement member of the feeding set adaptor to limit movement of the pump engagement portion.

17. The solution delivery system according to claim 16, wherein the at least one tube engaging member defines a recess, and wherein the abutment member comprises a collar configured for resting in the recess.

18. The solution delivery system according to claim 16, wherein the at least one tube engagement member comprises a first tube engagement member and a second tube engagement member disposed adjacent to each other with the monitoring portion extending therebetween.

19. The solution delivery system according to claim 18, wherein the pump engagement portion has a first abutment member disposed to engage the first tube engaging member and a second abutment member disposed to engage the second tube engaging member, the two abutment members being spaced apart and a distance therebetween constituting the monitoring portion of the pump engaging portion of the infusion set.

20. The solution delivery system according to claim 18, wherein the at least one tube engagement member further comprises a third tube engagement member and a fourth tube engagement member disposed adjacent to each other, and the pump engaging portion of the infusion set forming a second monitoring portion extending between the third tube engagement member and the fourth tube engagment member.

21. The solution delivery system according to claim 16, wherein the at least one tube engaging member and the at least one monitoring portion comprise a first monitoring portion and at least one tube engagement configured for disposition upstream from a pump rotor, and a second monitoring portion and at least one tube engagement member configured for disposition downstream from a pump rotor.

22. The feeding set adaptor according to claim 1, further comprising a sample cell formed as part of the adaptor.

23. The feeding set adaptor according to claim 22, wherein the sample cell has a pair of side walls disposed at an angle between about 45 and 100 degrees from one another.

24. The feeding set adaptor according to claim 23, wherein the sample cell defines a conduit having at least two sides which are disposed at an angle of about 50 to 60 degrees from one another.

25. The feeding set adaptor according to claim 24, wherein the conduit has a cross-section which is an equilateral triangle.

26. The feeding set adaptor according to claim 25, wherein the conduit has a cross-section which is an inverted equilateral triangle, the sides extending downwardly and inwardly.

27. The feeding set adaptor according to claim 24, wherein the conduit has a cross-section which is diamond shaped.

28. The feeding set adaptor according to claim 22, wherein the sample cell has an outer wall which extends toward point, and a generally linear base extending outwardly from the point and disposed to allow light to flow through the base with minimal refraction.

29. A solution delivery system comprising the feed set adaptor according to claim 22, and further comprising a housing disposed adjacent to the sample cell.

30. The solution delivery system according to claim 29, wherein the housing is spaced apart from the sample cell so as to form an air chamber between the housing and the sample cell.

31. The solution delivery system according to claim 29, wherein the housing has a pair of sidewalls which are disposed at

an angle of between about 45 and 100 degrees from one another.

32. The solution delivery system according to claim 31, wherein the housing further comprises a base disposed at an angle of about 50 to 60 degrees from each of the sidewalls.

33. A solution delivery system comprising the feed set adaptor according to claim 22, and further comprising a optical sensor disposed to project light into the sample cell.

34. The solution delivery system according to claim 33, wherein the optical sensor comprises an optical signal emitter and an optical signal detector, and wherein the sample cell is disposed between the optical signal emitter and the optical signal detector.

35. The solution delivery system according to claim 35, wherein the sample cell is configured to direct more light emitted from the optical signal emitter to the optical signal detector when the sample cell is at least partially filled with air.

36. A feeding set adaptor configured for mounting on an infusion pump, the feeding set adaptor comprising a connector for connecting an inflow tube and a pump engaging tube of an infusion

device, and a sample cell configured for optically detecting air bubbles within the sample cell.

37. The feeding set adaptor according to claim 36, wherein the sample cell comprises at least two side walls disposed at an angle of between about 45 and 100 degrees to one another.

38. The feeding set adaptor according to claim 37, wherein the sample cell comprises an equilateral triangle, with sidewalls disposed at an angle of about 50 to 60 degrees from one another.

39. The feeding set adaptor according to claim 38, wherein the sample cell further comprises a base disposed at one corner of the equilateral triangle.

40. The feeding set adaptor according to claim 36, wherein the sample cell defines a conduit which has a cross-section of an inverted equilateral triangle.

41. A solution delivery system including the feeding set adaptor according to claim 36, and further comprising an optical sensor disposed adjacent the sample cell.

42. The solution delivery system according to claim 41, wherein the optical sensor includes an optical signal emitter and an optical signal detector placed generally on opposing sides of the sample cell.

43. The solution delivery system according to claim 41, wherein the sample cell configured such that when disposed between the optical signal emitter and the optical signal detector, the sample cell will dispel some light emitted by the optical signal detector so that said light does not reach the optical signal detector.

44. The solution delivery system according to claim 41, wherein the sample cell is configured so that some light from the optical signal emitter will always reach the optical signal detector when the sample cell is disposed between the optical signal emitter and the optical signal detector.

45. The solution delivery system according to claim 44, wherein the sample cell comprises a base portion configured to channel light emitted by the optical signal emitter to the optical signal detector regardless of whether the sample cell is full or air or liquid.

46. The solution delivery system according to claim 41, wherein the system further comprises a housing disposed between the optical signal sensor and sample cell.

47. The solution delivery system according to claim 46, wherein the housing has a pair of sidewalls disposed at an angle of between about 45 and 100 degrees relative to one another.

48. The solution delivery system according to claim 47, wherein the housing and the sample cell each have side walls disposed at an angle of about 60 degrees to one anther and wherein said sidewalls of the sample cell are disposed in parallel to the sidewalls of the housing.

49. The solution delivery system according to claim 46, wherein the housing and the sample cell are spaced apart to define an air chamber therebetween.

50. The solution delivery system according to claim 46, wherein the sample cell has a base and wherein the housing has a base disposed generally parallel to the base of the sample cell.

51. The solution delivery system according to claim 46, wherein the optical sensor and the housing are formed as part of an infusion pump.

52. The feeding set adaptor according to claim 36, wherein the feeding set adaptor has a second connector for connecting the pump engaging portion to an outflow line of an infusion set.

53. The feeding set adaptor according to claim 36, wherein the adaptor further comprises at least one tube engagement member configured for engaging a pump engaging portion of an infusion set.

54. A solution delivery system having the feeding set adaptor according to claim 53, and further comprising a flexible tube attached to the feeding set adaptor, the flexible tube forming a pump engaging portion of an infusion set.

55. The solution delivery system according to claim 54, wherein the pump engaging portion of the infusion set has an abutment member for engaging the at least one tube engagement member.

56. The solution delivery system according to claim 55, wherein the feeding set adaptor has at least two tube engagement members and wherein the pump engagement portion of the infusion set has a central working portion and at least two abutment members, one being disposed adjacent opposing ends of the central working portion and configured to engage the tube engagement members.

57. The solution delivery system according to claim 56, wherein the system further comprises an enteral feeding pump with a rotor, and wherein at least one tube engagement member and at least one abutment member is disposed on the upstream side rotor and at least one tube engagement member and at least one abutment member is disposed on a downstream side of the rotor.

58. The solution delivery system according to claim 57, further comprising an optical sensor disposed adjacent the at least one tube engagement member disposed upstream from the rotor and configured to detect pressure in a flexible tube forming the pump engagement portion of an infusion set adjacent said at least one tube engagement member.

59. The solution delivery system according to claim 57, further comprising an optical sensor disposed adjacent the at least one tube engagement member disposed downstream from the rotor and configured to detect pressure in the in a flexible tube forming the pump engagement portion of an infusion set adjacent said at least one tube engagement member.

60. The solution delivery system according to claim 55, wherein the tube engagement member defines a recess, and wherein the abutment member is received in the recess.

61. The solution delivery system according to claim 60, wherein the adaptor has a first tube engagement member and a second tube engagement member and wherein the pump engaging portion has a first abutment member which engages the first tube engagement member and a second abutment member which engages the second tube engagement member, and a space between the first and second abutment members forming a monitoring portion.

62. The solution delivery system according to claim 61, wherein the system further comprises an optical sensor disposed adjacent the monitoring portion and configured to measure expansion and contraction of the monitoring portion.

63. The solution delivery system according to claim 61, wherein the adaptor has a third tube engagement member and a fourth tube engagement member and wherein the pump engaging portion has a third abutment member which engages the third tube engagement member and a fourth abutment member which engages the fourth tube engagement member, and a space between the third and fourth abutment members forming a monitoring portion.

64. The solution delivery system according to claim 63, wherein the system further comprises an optical sensor disposed adjacent the monitoring portion between the third and fourth abutment members and configured to measure expansion and contraction of said monitoring portion.

65. The solution delivery system according to claim 64, further comprising a means for generating an alarm when a pressure in a monitoring portion falls outside a predetermined range.

66. A feeding set adaptor for use with an infusion set, the feeding set adaptor having at least two tube engagement members configured for receiving and engaging a pump engaging portion of an infusion set, at least one of the at least two tube engagement members being configured for engaging an upstream portion of the

pump engaging portion and at least one of the at least two tube engagement members being configured for engaging a downstream portion of the pump engaging portion.

67. The feeding set adaptor according to claim 66, wherein the tube engagement members comprise flanges for securing the pump engagement portion.

68. The feeding set adaptor according to claim 66, further comprising a first connector configured for attachment to an inflow line of an infusion set and a second connector configured for attachment to an outflow line of an infusion set.

69. The feeding set adaptor according to claim 66, wherein the feeding set adaptor further comprises an anti-freeflow mechanism.

70. The feeding set adaptor according to claim 69, wherein the anti-freeflow mechanism comprises a stop sized for disposition inside a tube of an infusion set.

71. The feeding set adaptor according to claim 69, wherein the anti-freeflow adaptor comprises a flap.

72. A solution delivery system including a feeding set adaptor in accordance with claim 66, further comprising a flexible tube forming a pump engaging portion of an infusion set.

73. The solution delivery system according to claim 72, wherein the flexible tube engages the tube engagement members and forms at least one monitoring portion.

74. The solution delivery system according to claim 73, wherein the flexible tube has a first monitoring portion and a second monitoring portion.

75. The solution delivery system according to claim 74, wherein the system further comprises a pumping mechanism and wherein the first monitoring portion is disposed upstream from the pumping mechanism and the second monitoring portions is disposed downstream from the pumping mechanism.

76. The solution delivery system according to claim 74, wherein the feeding adaptor has a first tube engagement member and a second tube engagement member spaced apart from one another, and wherein the first monitoring portion is disposed between the first and second tube engagement members.

77. The solution delivery system according to claim 76, wherein the flexible tube has a first abutment member and a second abutment member for engaging the first tube engagement member and the second tube engagement member, respectively, to thereby limit axial movement of the flexible tube.

78. The solution delivery system according to claim 76, further comprising an optical sensor disposed adjacent the first and second tube engagement members.

79. The solution delivery system according to claim 76, wherein the feeding set adaptor has a third tube engagement member and a fourth tube engagement member and wherein the flexible tube has a third abutment member and a fourth abutment member for engaging the third tube engagement member and the fourth tube engagement member, respectively, to thereby limit axial movement of the flexible tube.

80. The feeding set adaptor according to claim 66, further comprising a sample cell.

81. The feeding set adaptor according to claim 80, wherein the feeding set adaptor has a first connector and a second connector and wherein the sample cell is disposed in one of the first and second connectors.

82. The feeding set adaptor according to claim 80, wherein the sample cell has a pair of sidewalls disposed at an angle of between about 45 and 100 degrees from one another.

83. The feeding set adaptor according to claim 82, wherein the sample cell has a base portion configured for transmitting light regardless of the contents of the sample cell.

84. A solution delivery system according to claim 82, further comprising a housing disposed adjacent the sample cell.

85. The solution delivery system according to claim 84, wherein the housing has a pair of sidewalls disposed at an angle of 50 to 60 degrees from one another.

86. A solution delivery system according to claim 82, further comprising an optical sensor disposed to transmit light into and detect light refracted in the sample cell.

87. A method for forming an infusion set, the method comprising;

selecting a feeding set adaptor having a first connector and a second connector formed integrally together;

attaching an infusion set inflow line to the first connector;

attaching an infusion set outflow line to the second connector; and

attaching a pump engaging portion of an infusion set to the first and second connectors so that the inflow line, the pump engaging portion and the outflow line are in fluid communication with one another.

88. The method according to claim 87, wherein the method comprises selecting a feeding set adaptor having an anti-freeflow mechanism.

89. The method according to claim 87, wherein the method comprises selecting a feeding set adaptor having a sample cell formed thereon.

90. The method according to claim 87, wherein the method comprises attaching the pump engaging portion to the feeding set adaptor to form at least one monitoring portion which has limited

axial movement.

91. A method for monitoring pressure in an infusion set, the method comprising:

selecting a feeding set adaptor having a pump engaging portion of an infusion set disposed thereon and defining a monitoring portion; and

disposing the monitoring portion in an optical sensor to detect pressure changes in the monitoring portion by changes in the diameter of the monitoring portion.

92. A method for preventing freeflow in an infusion set, the method comprising:

selecting a feeding set adaptor having a pump engaging portion of an infusion set disposed thereon and defining a monitoring portion and an anti-freeflow mechanism configured to selectively stop fluid flow through the infusion set; and

disposing the anti-freeflow mechanism in the infusion set to selectively preclude fluid flow therethrough.

93. A method for detecting air bubbles passing through an infusion set, the method comprising;

selecting a feeding set adaptor having a sample cell formed

thereon and having a pump engaging portion attached thereto;

passing solution through the sample cell; and

disposing the sample cell in an optical signal such that light is refracted differently when air is present in the sample cell than when solution is present in the sample cell to thereby determine the presence of air.

94. The method according to claim 93, wherein the method comprises emitting the light in a plane and positioning the sample cell so that a sidewall of the sample cell is at an angle less than normal to the plane.